COURSE OF STUDIES

GRADE SEVEN SCIENCE

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A. PROGRAM RATIONALE AND PHILOSOPHY

"The aim of education is to develop the knowledge, the skills and the positive attitudes of individuals, so that they will be self-confident, capable and committed to setting goals, making informed choices and acting in ways that will improve their own lives and the life of their community."

Secondary Education in Alberta, 1985

Science education contributes to this overall aim of education in several ways:

- first, by providing learning experiences that help students understand and interpret the world in which they live
- second, by developing knowledge, skills and attitudes that support the intelligent and responsible application of science and technology, and
- third, by developing a foundation of knowledge, skills and attitudes that support further study of the sciences.

To achieve these purposes, the Junior High Science Program provides a broad range of learning experiences in the biological, physical and earth sciences. In continuity with the elementary and senior high programs, the junior high program provides opportunity for study of most of the major branches of science, building on the experiences of the elementary school and providing a foundation for more formal studies at the senior high level.

In keeping with the developmental level of students, concepts are introduced through a broad range of experiences, including those based on first-hand investigation. Attention is also given to the development of information accessing and research skills and to the use of technological materials (e.g., computers and interface devices). Learnings based on these experiences are extended as students are given opportunities to reflect on their experiences, learning to discover and construct meaning through careful and focused thought. Learning activities are thus designed not only to illustrate established science ideas, but also to allow students to construct new meanings and find new applications to what they learn.

Learnings within the program are presented in contexts that illustrate the development and application of science. Frequent attention is given to the processes by which scientific knowledge is gathered, largely by involving students directly in the practice of scientific inquiry. Significant attention is also given to other contexts of science: in particular the application of science to the solution of practical problems, and the examination of the implications of science and technology with respect to personal and social impact. The processes of problem solving and decision making are given direct attention in learning activities: students are thus involved in ways that will stimulate their critical and creative thinking skills.

In broad terms, the intended outcome of the secondary science program is the development of a scientifically literate citizenry. A scientifically literate person is one who:

- demonstrates a working knowledge and practical understanding of the sciences
- has the ability to evaluate scientific evidence
- understands the processes by which scientific knowledge is developed and can adapt those processes for personal use
- applies science concepts, theories and processes to the investigation of everyday problems
- understands the relationship of science and technology
- demonstrates awareness of how science and technology can function responsibly in a social context
- recognizes the limitations as well as the usefulness of science and technology in advancing human welfare, and
- demonstrates a continuing interest in science and technology.

B. GENERAL LEARNER EXPECTATIONS

These general learner expectations are to be developed through the program as a whole with particular attention to be given in designated units, as identified in individual unit outlines. General learner expectations are listed in association with three major areas of emphasis:

Nature of Science
Science and Technology
Science, Technology and Society

Concepts, skills and attitudes have been identified for each of these three areas of emphasis as well as for specific units at each grade level. Note that each area of emphasis provides an overall context for learning basic scientific concepts and principles related to students' experiences. One of these contexts provides the primary basis for development of each unit in the program.

NATURE OF SCIENCE

Attitudes

Students will be encouraged to develop:

1. Curiosity about events and objects in the natural world.
2. Appreciation of the beauty and complexity of the natural world.
3. Respect for accuracy and precision.
4. Honesty and completeness in reporting and evaluating observable data.
5. Open-mindedness in considering alternative ideas and interpretations.
6. Critical-mindedness in evaluating inferences and conclusions.
7. Confidence in personal ability to design and conduct a scientific investigation.

Science Inquiry Skills

Students will demonstrate:

1. Questioning
   - recognizing patterns and discrepant events
   - identifying and asking relevant questions
2. Proposing Ideas
   - hypothesizing
   - predicting
3. Designing Experiments
   - identifying and controlling variables
   - developing procedures
4. Gathering Data
   - observing
   - measuring
5. Processing Data
   - organizing and presenting data
   - identifying patterns and trends
6. Interpreting Data
   - inferring
   - developing theoretical explanations

Concepts

Students will demonstrate an understanding that:

1. Science is a disciplined way to develop explanations for natural phenomena.
2. Scientific knowledge is cumulative and subject to change.
3. Significant aspects of the scientific enterprise include:
   - observable data that can be repeatedly demonstrated in various places, at different times, by different investigators
   - experimentation (scientific inquiry) as a means to support, modify, or reject proposed ideas about natural phenomena
   - interpretations and conceptual inventions that are theoretical in nature

SCIENCE AND TECHNOLOGY

Attitudes

Students will be encouraged to develop the following attitudes:

1. Appreciation of the need for technological devices and processes to serve human needs.

2. Appreciation of the contribution of science to the solution of practical probiems.

3. Awareness of alternatives in the approach to technological problems.

4. Respect for the creative and critical thinking processes.

5. Appreciation of good design (from an aesthetic as well as a functional perspective).

6. Willingness to take initiative in dealing with practical problems.

7. Confidence in personal ability to solve practical problems.

Technological Problem Solving Skills

Students will demonstrate the following skills:

1. Understanding the Problem

    - identifying the purpose
    - identifying specific requirements (specifications)

2. Developing a Plan

    - identifying alternatives
    - planning and designing

3. Carrying Out the Plan

    - testing the design
    - troubleshooting

4. Evaluating

    - evaluating the design
    - evaluating the planning process

Concepts

Students will demonstrate an understanding that:

1. Science and technology are interrelated:

    - the development of new technologies may open new areas for scientific investigation
    - solving technological problems frequently involves the application of scientific knowledge.

2. Technology is a process of solving practical problems.

3. Significant aspects of the technological problem-solving process include:

    - approaching the problem in a planned way
    - development of a practical design as a means to support, modify, or reject alternative ideas for solving the problem
    - creativity and inventiveness in developing solutions that achieve the intended purpose
    - critical thinking in the evaluation of potential solutions and in the identification of areas in which improvement might be made.

4. Technological development involves both products and processes.

5. Technologies arise from common practices and traditions as well as from the creative application of scientific knowledge.

SCIENCE, TECHNOLOGY AND SOCIETY

Attitudes

Students will be encouraged to develop the following attitudes:

1. Appreciation of the need for informed decision making at both personal and societal levels.

2. Appreciation of the contributions and limitations of scientific and technological knowledge to the societal decision-making process.

3. Confidence in using scientific and technological knowledge to inform personal decision making.

4. Commitment to the pursuit of knowledge and the responsible application of that knowledge.

5. Appreciation of different perspectives that bear upon the societal decision-making process.

6. Respect for the perspectives and viewpoints of others.

Decision-Making Skills

Students will demonstrate the following skills:

1. Identifying the Issue

2. Identifying Alternatives

3. Researching

    - examining background information
    - examining perspectives on each alternative
    - identifying consequences of each alternative

4. Reflecting and Deciding

    - considering consequences
    - considering perspectives
    - building consensus

5. Taking Action

    - demonstrating responsibility through personal action
    - demonstrating responsibility through actions as a member of a group

6. Evaluating

    - evaluating effects of actions
    - evaluating the decision-making process used

Concepts

Students will demonstrate an understanding that:

1. Knowledge of science and technology helps inform the societal decision-making process.

2. Societal decision making aims at choosing actions most appropriate for existing circumstances by comparing and evaluating the consequences of alternative proposals.

3. The societal decision-making process works toward building a consensus. Significant aspects of social decision making include:

    - recognition of the advantages and limitations of scientific and technological knowledge for informing the process
    - consideration of other perspectives (e.g., economic, ethical, political), in addition to scientific and technological perspectives, in informing decision making about science related issues
    - deliberation as a means to clarify, support, modify, or reject alternative proposals for action
    - recognition of the need for trade-offs in order to achieve workable solutions in science-technology-society problems.

4. Relationships among science, technology, and societal decision making occur at many levels:

    - developments in science and technology often significantly impact on society.
    - societal needs and concerns often stimulate or influence technological problem solving and scientific inquiry.

5. Many of the effects of science and technology on society are unforeseen.

C. SPECIFIC LEARNER EXPECTATIONS

1. TOPICS OF STUDY

The program is comprised of six units at each grade level. Each unit focuses on a particular science topic and develops a learning context that contributes to the student's overall understanding of science and technology.

The instructional time for each unit varies, but at each level the program is based on 100 hours of instructional time.

2. REQUIRED/ELECTIVE COMPONENTS

Each unit of the program has a required component and an elective component, defined as follows:

The **required** component encompasses the knowledge, skills and attitudes that all students should be expected to acquire. This component comprises 80% of the program.

The **elective** component, which comprises 20% of the program, provides opportunities to adapt and enhance instruction to meet the diverse needs, abilities and interest of individual students. It encourages enrichment and remediation consistent with the content and objectives of the required component.

The program content for both the required component and the elective component is defined by the same statements of objectives.

3. OPTIONAL CONTENT

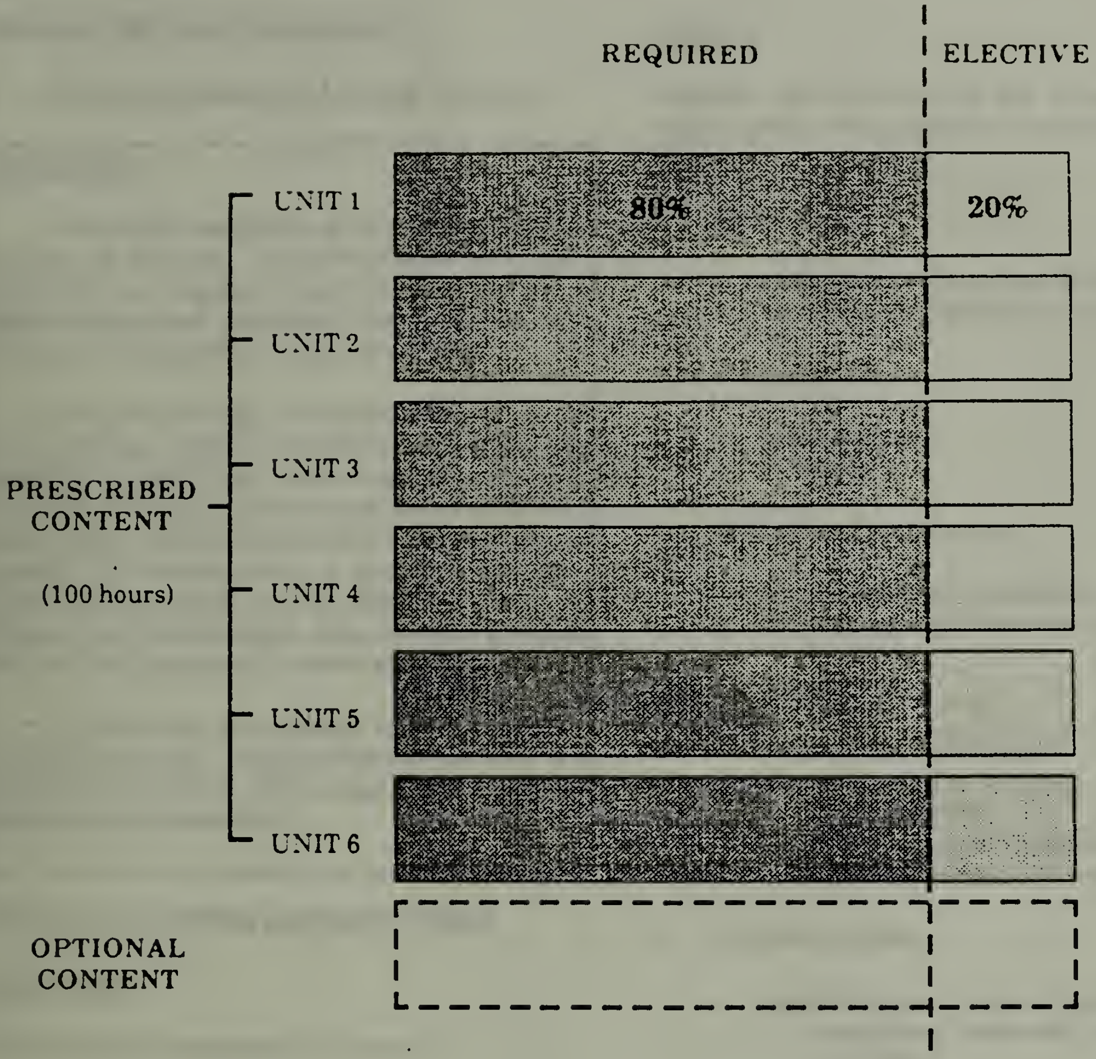
(Note: there will be no requirement that optional content be included within a school's Junior High Science Program.)

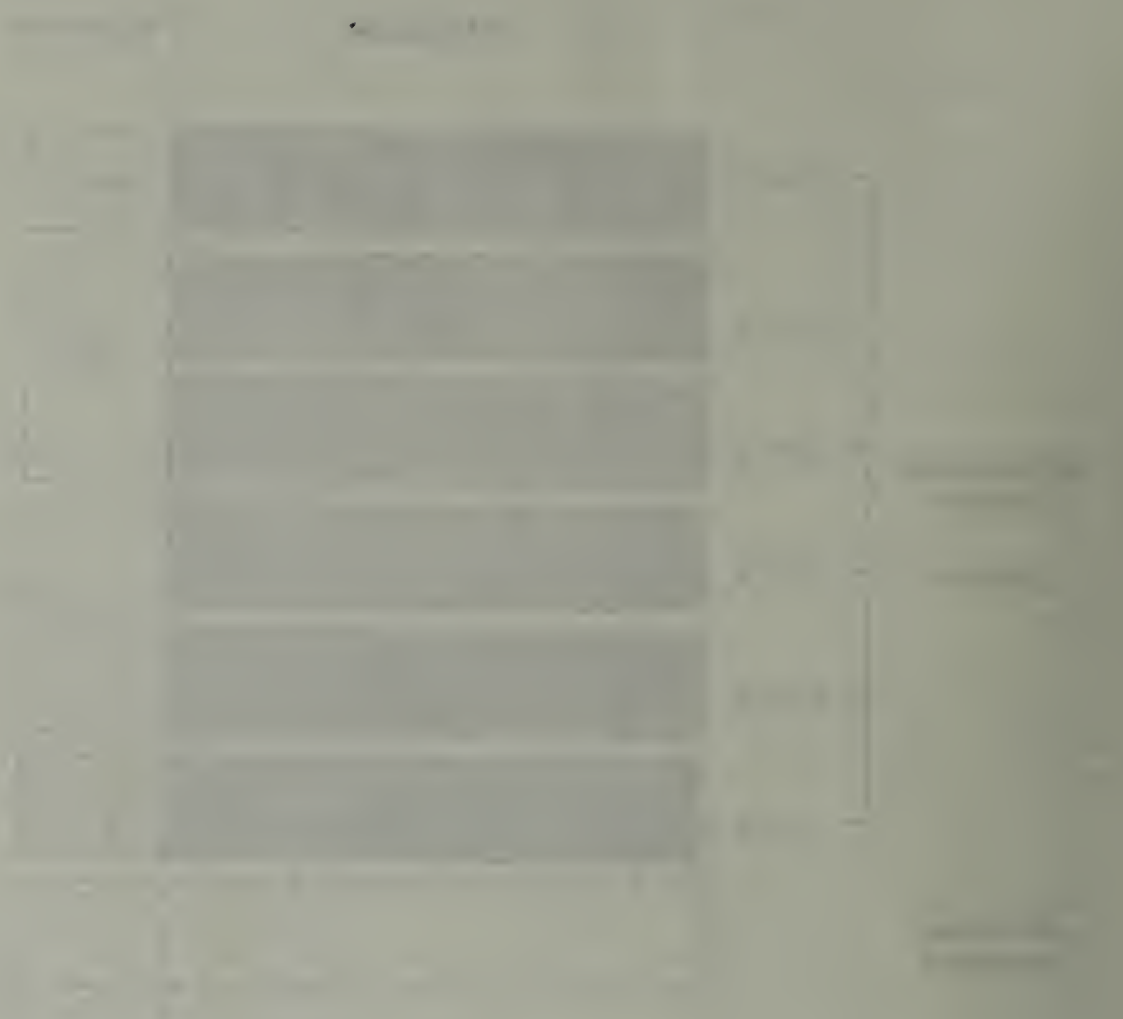
Instructional content that is provided beyond the mandatory 100 hours of instruction shall be deemed to be optional. Optional content to the program may take several forms:

- an extension of a prescribed unit
- a suggested option identified in the *Teacher Resource Manual*
- an option based on local choice

Selection of topics for development as optional units may be made at the local school level, based on local needs and resources. To assist the school in the choice and development of topics, brief outlines will be provided and, where available, resources will be identified. Optional topics may include units that have been developed or selected locally, subject to the following provisions being met.

- All program content must support the overall goals of the program.
- Inclusion of optional content must not detract from the achievement of required program objectives or from elective content associated with the required program.
- Optional content must not duplicate or unduly overlap content to be developed in a subsequent year of the secondary science program.


REQUIRED
ELECTIVE
UNIT 1
80%
20%
UNIT 2
UNIT 3
UNIT 4
UNIT 5
UNIT 6
PRESCRIBED CONTENT
(100 hours)
OPTIONAL CONTENT



GRADE SEVEN PROGRAM

1. Characteristics of Living Things

OVERVIEW

The major emphasis of this unit is on the nature of science. Opportunities are also provided to support learnings regarding technologies and regarding the relationship among science, technology and society.

This unit provides an introductory study of living things, with a particular focus on the methods by which the knowledge is acquired. Throughout the unit, students are expected to view living things either through direct observation or through the interpretation of pictorial material. Observational studies of organisms will focus on patterns and relationships, with attention given to the study of structures, functions and adaptations.

A wide range of organisms may be chosen as examples for study. Studies of the human body are included in this unit, with a particular focus on monitoring and measuring.

SPECIFIC LEARNER EXPECTATIONS

ATTITUDES

Students will be encouraged to develop:

1. appreciation of the beauty and complexity of living things
2. commitment to the care of living things
3. appreciation of the adaptive value of structural and behavioural characteristics of plants and animals
4. confidence in personal ability to design and conduct a scientific investigation of living plants or animals
5. awareness of techniques for monitoring life functions.

SKILLS

Students will demonstrate the following science inquiry skills with emphasis on those that appear in boldface.

1. Questioning
   - recognizing patterns and discrepant events
   - identifying and asking relevant questions
2. Proposing Ideas
   - hypothesizing
   - predicting
3. **Designing Experiments**
   - **identifying and controlling variables**
   - **developing experimental procedures**
4. **Gathering Data**
   - **observing living things**
   - **observing and measuring**
     - **lung capacity**
     - **breathing and heart rates**
     - **responsiveness to stimuli**
5. **Processing Data**
   - **organizing and presenting data**
     - **classifying materials as living and non-living**
   - identifying patterns and trends
6. **Interpreting Data**
   - **inferring the value of adaptations based on observations of living things**
   - developing theoretical explanations

CONCEPTS

1. The study of living things is based on observation, classification and interpretation.

   Students will be expected to:

   - recognize the role of observation, classification and interpretation in the scientific study of living things

- distinguish between living and non-living things on the basis of observable characteristics
- identify and describe characteristics of living things: in particular, their ability to grow and reproduce, their ability to respond to environments, and their ability to produce or take food in
- identify and describe commonalities among groups of living things
- identify and describe differences among groups of living things
- recognize and describe variation within groups of living things.

2. The concept of life cycle provides a basis for interpreting change in living organisms.

Students will be expected to:

- describe and give examples of the concept of life cycle
- describe and compare different life cycles
- describe patterns of growth and organization within organisms.

3. The concept of adaptation provides a basis for interpreting the structure and behaviours of living things.

Students will be expected to:

- identify examples of adaptive structures
- describe animal adaptations for one or more specific purposes (e.g., locomotion, reproduction)
- describe plant adaptations for one or more specific purposes
- recognize and evaluate the adaptive value of external features for specific plants and animals studied
- identify examples of adaptive behaviours.

4. The concept of stimulus and response is used in interpreting organisms behaviour in relation to changing environmental conditions.

Students will be expected to:

- identify examples of stimulus-response patterns in the behaviour of organisms
- recognize and describe responses of the human body to changing environmental conditions
- recognize responses to specific environmental conditions
- distinguish between instinctive and learned responses.

2. Structures and Design

OVERVIEW

The major emphasis of this unit is on science and technology. Opportunities are also provided to support learning regarding the nature of science and regarding the relationship among science, technology and society.

This unit provides an introduction to the study of natural and human-built structures. Students will observe design in a variety of situations and infer general patterns and principles relating to those designs. In examining these structures, attention is given to the function of the overall structure and to the function of individual components. The scientific study of materials is also introduced in this unit.

Students are provided frequent opportunities to apply their ideas about structures to the solution of practical problems. Throughout the unit students are involved in design and construction activities using simple materials; these activities develop the skills of technological problem solving.

The use of alternative materials and approaches is important to this study. Students learn to evaluate alternative approaches in terms of their overall effectiveness. In so doing, they come to appreciate that there may be more than one solution to a problem and that there is value in considering alternative approaches. Social, environmental and aesthetic considerations are also taken into account in this study.

SPECIFIC LEARNER EXPECTATIONS

ATTITUDES

Students will be encouraged to develop:

1. appreciation of functional value of good design
2. appreciation of aesthetic value of good design
3. awareness and appreciation of variation in design in providing multiple alternative solutions to given problems
4. appreciation of the presence of similar principles of design in both natural and manufactured things
5. confidence in personal ability to design and build a functional structure

SKILLS

Students will demonstrate the following technological problem-solving skills, with emphasis on those that appear in boldface.

1. Understanding the Problem
    - identifying the purpose
    - identifying specific requirements (specifications)
2. **Developing a Plan**
    - **identifying alternative design solutions to building a load-bearing structure**
    - **planning and designing a load-bearing structure**
3. **Carrying Out the Plan**
    - **testing the design by constructing a load-bearing prototype using materials such as cardboard or wood**
    - **troubleshooting the design: identifying and correcting weaknesses in the structure**
4. **Evaluating**
    - **evaluating the design**
    - **evaluating the planning process**

CONCEPTS

1. Design can be observed in both natural and human-constructed materials.

    Students will be expected to:

    - identify patterns of organization in natural materials
    - recognize stems and skeletons as structural components of living things
    - infer the function of plant and animal structures
    - identify patterns of organization in human-constructed materials
    - recognize similarities in natural and human-constructed structures

2. Structures are designed in response to human needs, purposes and aspirations.

   Students will be expected to:

   - infer and describe the function of human-made structures (e.g., shelter, containment, support)
   - recognize examples of ways in which human aspirations have been achieved through the design and construction of structures

3. Alternative approaches are considered in the design of human-constructed structures.

   Students will be expected to:

   - recognize common approaches to the design of bridges and buildings
   - distinguish between rigid and non-rigid structures
   - infer the purpose of components in human-made structures
   - recognize examples of various materials being used for the same design function
   - recognize the relationship between choice of materials and the design used

4. Knowledge of materials and structural principles can contribute to the design process.

   Students will be expected to:

   - describe processes for testing the strength of materials
   - measure and compare the strength of materials
   - distinguish between tensile and compressive forces
   - identify points of tension and compression in a structure
   - describe the potential effects of tensile and compressive forces on different components of a structure
   - recognize the role of ties and linkages in adding to the overall strength and stability of a structure
   - describe the effect of the use of different shapes on the strength and stability of materials
   - identify the function of hinged components in natural and human-made materials
   - describe the function of different kinds of hinged components

5. Selection of material and a design is based on many considerations.

   Students will be expected to:

   - identify environmental implications of design decisions
   - recognize costs to be considered in design decisions
   - recognize the need to balance functional, aesthetic, economic and environmental concerns

6. Designs may need to accommodate specialized needs or environmental conditions.

   Students will be expected to:

   - identify differences in requirements of structures built on earth and in space
   - recognize similarities and differences in approaches to construction used on earth and in space

3. Force and Motion

OVERVIEW

The major emphasis of this unit is on the nature of science. Opportunities are also provided to support learning regarding technologies and the relationship among science, technology and society.

This unit provides students with the opportunity to study a variety of forces and examine the effects of those forces on objects and materials. For the most part, the unit uses an observational and experimental approach. Students learn to recognize and measure forces, then focus on the effects of those forces within different systems and in different applications.

A study of the causes and effects of friction, and a study of motion in space are both included within this unit.

SPECIFIC LEARNER EXPECTATIONS

ATTITUDES

Students will be encouraged to develop:

1. awareness of the need for specialized science terminology (e.g., to distinguish between force and mass)
2. appreciation of current technologies used in measuring force and mass
3. awareness of the pervasiveness of frictional forces in natural and human-made systems
4. appreciation of technologies used to reduce friction

SKILLS

Students will demonstrate the following science inquiry skills with emphasis on those skills that appear in boldface.

1. Questioning
   - recognizing patterns and discrepant events
   - identifying and asking relevant questions
2. **Proposing Ideas**
   - hypothesizing
   - **predicting consequences of forces**
3. **Designing Experiments**
   - identifying and controlling variables
   - **developing procedures**
     - **selecting and/or developing appropriate techniques for measuring forces and masses**
4. **Gathering Data**
   - **observing the effects of forces**
   - **measuring**
     - **measuring forces and masses**
     - **estimating forces and masses**
5. **Processing Data**
   - organizing and presenting data
   - **identifying patterns and trends**
6. **Interpreting Data**
   - **inferring force and motion relationships**
   - developing theoretical explanations

CONCEPTS

1. Forces are observed indirectly; the presence of a force can be inferred from its effects.

   Students will be expected to:

   - infer the application of a force based on observed movements (mechanical effects)
   - describe the direction of a force
   - identify examples of mechanical, gravitational, magnetic, frictional, buoyant and electrostatic forces
   - describe the effects of these forces

2. Forces can be compared and measured by various means.

   Students will be expected to:

   - identify appropriate means for detection and measurement of different kinds of forces

- identify and describe the principles on which various kinds of force measurers are based
- recognize and use units of force (Newtons)

3. The gravitation force on an object is identified as its weight. The weight of an object can be found to vary according to the gravitational field in which the weight of the object is measured.

Students will be expected to:

- recognize and describe the effects of gravitational force
- describe changes in gravitational force that result from a change of position in space

4. The concept of mass has been developed to identify a characteristic of an object which is constant for the object, regardless of its gravitational frame of reference.

Students will be expected to:

- identify appropriate means for measuring mass
- distinguish between mass and weight
- recognize and use units of mass (grams and kilograms)
- identify differences in scientific and everyday approaches to identifying the mass of an object

5. Relative motion of objects are affected by forces that act between those objects. Motions of objects can be interpreted or predicted based on knowledge of forces.

Students will be expected to:

- describe and predict the pathways of moving objects
- describe and predict changes in movement that result from the application of forces
- identify evidence and effects of friction
- identify factors which affect friction
- describe methods of increasing or decreasing frictional forces
- describe movement of materials in space environments
- identify action-reaction pairs
- identify forces in action-reaction pairs

4. Temperature and Heat Measurement

OVERVIEW

The major emphasis of this unit is on the nature of science. Opportunities are also provided to support learning regarding technologies and regarding the relationship among science, technology and society.

This unit examines the effects of heat and temperature changes with particular attention to approaches to measurement.

In introductory activities, students examine the effects of temperature change on various materials. The knowledge gained in these activities is then applied to practical problems of temperature measurement. The need for accuracy and the need for specialized thermometers for various applications are considered. Effects of heating and cooling of water are noted and a concept of heat as being distinct from temperature is introduced. Attention is also given to determining the quantity of heat energy in different foods and fuels. The uses of different sources of heat are considered.

SPECIFIC LEARNER EXPECTATIONS

ATTITUDES

Students will be encouraged to develop:

1. respect for precision in measurement
2. appreciation of human ingenuity and skill in the development of technologies used in measurement (focus on temperature measurement)
3. recognition of the need for specialized instrumentation for specific applications

SKILLS

Students will demonstrate the following science inquiry skills, with emphasis on those skills that appear in boldface.

1. Questioning
   - recognizing patterns and discrepant events
   - identifying and asking relevant questions
2. Proposing Ideas
   - hypothesizing
   - predicting
3. **Designing Experiments**
   - identifying and controlling variables
   - **developing procedures**
     - **selecting and using appropriate instruments for measuring temperature**
4. **Gathering Data**
   - **observing the effects of heat on materials**
   - **measuring**
     - **estimating temperature**
     - **selecting and using appropriate instruments for measuring temperature**
     - **measuring temperature**
5. **Processing Data**
   - **organizing and presenting data**
   - **identifying patterns and trends**
6. **Interpreting Data**
   - **inferring**
   - **developing theoretical explanations**

CONCEPTS

1. The temperature of a substance provides a measure of its relative hotness or coldness compared with an arbitrary temperature scale.

   Students will be expected to:

   - infer temperatures based on physical properties of materials (e.g., colour, physical state)
   - describe temperatures of materials in descriptive non-quanitative terms

2. The need for precision in temperature measurement has led to the development of thermometers and temperature scales.

   Students will be expected to:

   - infer the need for precise temperature measurement in given applications
   - infer the accuracy of a temperature measuring device
   - describe the Celsius temperature scale and identify significant temperatures on that scale (e.g., melting and freezing point of water, body temperature)
   - calibrate a thermometer
   - estimate temperatures of materials in degrees Celsius

3. Thermal expansion and contraction provides the basis for thermometry.

   Students will be expected to:

   - predict changes in materials due to heating and cooling
   - compare the amount of thermal expansion for different materials
   - describe the components of liquid thermometers and the functions of those components
   - describe the operation of liquid and air thermometers in relation to the design of the devices and the principles by which they operate
   - describe the operation of various specialized thermometers in relation to their design and the principles by which they operate

4. The scientific concept of heat is used to describe the thermal energy in a material.

   Students will be expected to:

   - recognize that when a hot substance loses heat energy, its temperature decreases; when a cold substance absorbs heat, its temperature increases
   - estimate final temperature of a mixture of equal quantities of a liquid at different temperatures
   - recognize that the final temperature of liquid mixtures is affected by the mass and heat-related characteristics of the original components
   - distinguish between the concept of heat and the concept of temperature
   - describe temperature and heat in terms of particle motion

5. Heat energy can be derived from a number of sources

   Students will be expected to:

   - identify sources of heat (e.g., mechanical, chemical, electrical)
   - identify advantages and disadvantages of the use of various heat sources
   - recognize that different fuels may have a different heat energy content
   - compare the energy content of different fuels; e.g., wood, coal, natural gas
   - compare energy content of different foods

5. Micro-organisms and Food Supplies

OVERVIEW

The major emphasis of this unit is on science, technology and society. Opportunities are also provided to support learning regarding technologies and the nature of science.

This unit examines the means by which food supplies are maintained safely for human consumption. It focuses on personal and public decisions that affect the safety of food supplies. Scientific and technological developments are presented as background, providing a basis for knowledgeable decision making and action.

Within the unit, students are involved in observational studies of organisms and become aware of the kinds of micro-organisms found within a wide range of habitats. This study leads to an examination of the technologies used in food preparation and preservation. Particular attention is given to identifying and evaluating alternative technology, and to the issues, decisions and standards relating to the safe handling of food.

SPECIFIC LEARNER EXPECTATIONS

ATTITUDES

Students will be encouraged to develop:

1. awareness of the widespread distribution of micro-organisms
2. awareness of the role of scientific knowledge and technologies in maintaining a healthy food supply
3. recognition of the need for safety standards to prevent the spread of disease through food
4. a safety attitude regarding the selection, preparation and handling of food materials

SKILLS

Students will demonstrate the following decision-making skills, with emphasis on those skills that appear in boldface.

1. **Identifying issues regarding the safe handling of food.**
2. **Identifying alternative approaches to the handling and processing of food.**
3. Researching
   - **examining background information about alternative technologies for eliminating disease-causing organisms from food supplies**
   - **examining perspectives on each alternative**
   - **identifying consequences of each alternative**
4. Reflecting and Deciding
   - considering consequences
   - considering perspectives
   - building consensus
5. Taking Action
   - **demonstrating responsibility through personal actions**
   - demonstrating responsibility in actions as a member of a group
6. Evaluating
   - evaluating effects of actions
   - evaluating the decision-making process used

CONCEPTS

1. There is need for personal and public decision-making regarding the safe handling of food.

   Students will be expected to:

   - identify practical difficulties in the management of food supplies
   - identify and describe diseases that commonly result from improper food handling

2. Micro-organisms are found in a variety of habitats

   Students will be expected to:

   - describe variations in size, shape and movement of micro-organisms

- identify natural habitats of micro-organisms
- identify habitats of micro-organisms in human-made environments and materials
- describe examples of micro-organisms that cause disease in humans
- identify factors that enhance or inhibit the growth of micro-organisms

3. Micro-organisms play significant roles in relation to human food supplies

   The student will be expected to:

   - describe the role of micro-organisms as decomposers
   - describe changes in food material as it supports the growth of a mould culture
   - recognize micro-organisms as the prime agents of food spoilage
   - identify examples of the use of micro-organisms in food production
   - identify significant food-borne pathogens

4. Technologies for the preservation of human food involve various approaches to the elimination of micro-organisms and to safe containment of uncontaminated food.

   Students will be expected to:

   - identify unsafe food handling procedures
   - describe food handling procedures that help assure the safety of food supplies
   - identify and describe technologies used in the preparation, preservation and protection of food for human consumption
   - identify potential problems as well as benefits in food preservation procedures

5. The determination of appropriate food handling procedures necessitates both personal and public decision-making.

   Students will be expected to:

   - recognize that the safe processing and handling of food involves the cooperative effort of many people in many different roles
   - identify factors that might contribute to the lack of safety at various stages of food handling
   - infer the need for safety standards regarding food handling procedures
   - identify specific areas in which standards need to be established
   - identify regulatory agencies responsible for monitoring food handling procedures and products
   - identify the role of science in the setting and enforcement of safety standards
   - recognize that various perspectives (including scientific, economic, environmental, ethical, societal and personal) may need to be considered in decisions regarding the setting and enforcement of a standard
   - describe personal actions in ensuring the safety of personal food supplies

6. Evidence of Erosion

OVERVIEW

The major emphasis of this unit is on the nature of science. Opportunities are also provided to support learning regarding technologies and the relationship among science, technology and society.

This unit examines changes in the surface of the earth, which result from the erosion, transport and deposition of earth materials.

The unit provides insights into the scientific study of earth changes. Students observe a variety of mechanisms by which gradual changes occur, then consider the cumulative effect of the changes over long periods of time. This long-term view is applied to the interpretation of local landscapes.

Students are given opportunities to predict the impact of geological changes on human-built structures and human-modified environments. Consideration is given to related problems and issues that arise.

(Note: in this unit, attention is focused on changes which involve weathering, erosion, transport and deposition of materials; the Grade 8 unit on the earth's crust focuses on those forces that lead to mountain building and plate movement.)

SPECIFIC LEARNER EXPECTATIONS

ATTITUDES

Students will be encouraged to develop:

1. awareness and appreciation of the effects of geological change over long periods of time
2. respect for the power of geological forces
3. appreciation of the dependence of humankind on the physical earth
4. appreciation of the need to incorporate a knowledge of geological change in long-term land use planning

SKILLS

Students will demonstrate the following science inquiry skills, with emphasis on those that appear in boldface.

1. Questioning
   - identifying and asking relevant questions
   - defining problem statements
2. **Proposing Ideas**
   - hypothesizing
   - **predicting (based on extension of current trends and changes)**
3. Designing Experiments
   - identifying and controlling variables
   - developing procedures
4. **Gathering Data**
   - **observing**
   - **measuring**
     - **size of sediments**
     - **rates of stream flow**
5. **Processing Data**
   - organizing and presenting data
   - **identifying patterns and trends**
6. **Interpreting Data**
   - **inferring causes of phenomena observed**
   - developing theoretical explanations

CONCEPTS

1. The study of ongoing changes to the earth's surface provides the basis for scientific interpretation of current landforms.

   Students will be expected to:

   - recognize ongoing processes of earth change

- distinguish between rapid and gradual changes
- recognize long-term effects of gradual changes
- infer processes that have led to major erosional features

2. Various forms of weathering provide mechanisms for breaking down earth materials.

   Students will be expected to:

   - recognize evidence of weathering
   - describe mechanical, biological and chemical processes of weathering
   - identify factors that may contribute to the rate of weathering

3. Erosion causes the breakdown and movement of earth materials.

   Students will be expected to:

   - recognize evidence of erosion
   - identify wind, water and ice as agents of erosion
   - recognize sediments as materials that have been transported by wind or water
   - recognize erosion and deposition as start points and end points in the transport of materials by wind, water and ice
   - describe and classify sediments
   - relate the sediment load of a stream to its volume and rate of movement
   - observe and describe changes in shorelines that result from erosion or deposition
   - observe and describe changes in river courses (e.g., meandering) that occur as a result of long-term erosion and deposition
   - observe and describe changes in stream profile as a river system ages

4. Movement of water occurs below as well as at the surface of the land.

   Students will be expected to:

   - observe and interpret the porosity of different earth materials
   - predict groundwater flow based on the slope and porosity of earth materials

5. Earth materials may be transported by glaciers.

   Students will be expected to:

   - describe the accumulation, movement and melting processes of glaciers
   - identify the range and location of glaciers, past and present
   - infer glacial presence and movement from landscape features

6. Earth changes that result from erosion and transport of materials can be predicted and, to some extent, controlled.

   Students will be expected to:

   - predict the effects of gradual geological changes acting over long periods of time
   - infer susceptibility to erosion (based on slope, subsurface composition and surface cover)
   - recognize and describe methods for controlling erosion
   - identify potential problems in the siting of buildings in relation to landscape features that are undergoing geological change

D. LEARNING RESOURCES

BASIC LEARNING RESOURCES

GRADE SEVEN

Science Directions 7 by W.C. Durward et al. John Wiley and Sons, Arnold Publishing, 1989.

Science Plus Technology Society 7 by C.P. McFadden et al. Harcourt Brace Jovanovich, Canada, 1989.

RECOMMENDED AND SUPPLEMENTARY LEARNING RESOURCES

LB 1629-5 A3 A35 1984 GR-7-9
ADD-SC-07 1989
PROGRAM OF STUDIES FOR JUNIOR
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